

Code: A-P616123-M

I SEMESTER EXAM - 2025-26

4 x 910

Std.: XII

Sub: Physics

Marks: 70

Date:

Roll No.: _____

Time:

General Instructions :

The question paper is divided into FOUR sections.

- 1) **Section A :** Q. No. 1 contains **Ten multiple choice** type of questions carrying one mark each.
Q. No. 2 contains **Eight very short answer types** of questions carrying one mark each.
- 2) **Section B :** Q. No. 3 to Q. No. 14 contains **Twelve short answer types** of questions carrying two marks each. (Attempt any High questions.)
- 3) **Section C :** Q. No. 15 to Q. No. 26 contains **Twelve short answer types** of questions carrying **three marks each**. (Attempt any Eight questions.)
- 4) **Section D :** Q. No. 27 to Q. No. 31 contains **Five long answer types** of questions carrying four marks each. (Attempt any Three questions.)
- 5) Use of a log table is allowed.
- 6) Figures to the right indicate full marks.
- 7) For each MCQ's, the correct answer must be written along with its alphabet.
- 8) Physical Constants:
 - i) $h = 6.63 \times 10^{-34} \text{ Js}$
 - ii) $c = 3 \times 10^8 \text{ m/s}$
 - iii) $\pi = 3.142$
 - iv) $g = 9.8 \text{ m/s}^2$
 - v) $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{N m}^2$
 - vi) $\mu_0 = 4\pi \times 10^{-7} \text{ Wb/Am}$
 - vii) mass of electron $m_e = 9.11 \times 10^{-31} \text{ kg}$
 - viii) Charge on electron $e = 1.6 \times 10^{-19} \text{ C}$

SECTION - A

Q.1 Select and write the correct answers for the following multiple choice type of questions :

(10)

- i) For which of the following bodies, the principle of perpendicular axes is applicable?
 - a) Spherical
 - b) Conical
 - c) Cylindrical
 - d) ☒ Laminar
- ii) Which of the following equations represents a simple harmonic progressive wave travelling along the negative X-direction?
 - a) $Y = a \sin(kx - wt)$
 - b) $Y = a \sin(kx + wt)$
 - c) $Y = a \sin(ky - wt)$
 - d) $Y = a \sin(ky + wt)$
- iii) For which of the following metals, photoelectric effect is possible for visible radiation?
 - a) Zinc
 - b) Cadmium
 - c) Magnesium
 - d) Sodium
- iv) The gyromagnetic ratio of electron is _____.
 - a) $2m_e / e$
 - b) $2m_e / e^2$
 - c) $e / 2m_e$
 - d) $e^2 / 2m_e$
- v) To convert a moving coil galvanometer into an ammeter we need to connect a _____.
 - a) small resistance in parallel with it
 - b) large resistance in series with it
 - c) small resistance in series with it
 - d) large resistance in parallel with it
- vi) Cyclotron is used to accelerate
 - a) neutral particles
 - b) negatively charged particles
 - c) ☒ positively charged particles
 - d) all types of particles

P.T.O

- Q.3** State and prove the law of conservation of angular momentum.
- Q.4** How will you convert a moving coil galvanometer into a voltmeter ?
- Q.5** Distinguish between free vibrations and forced vibrations. (Any 2 points)
- Q.6** Calculate the value of magnetic field at a distance 3 cm from a very long straight wire carrying a current of 6 A. *2 Pa*
- Q.7** Distinguish between diamagnetic and paramagnetic substances. (Any 2 points)
- Q.8** State any two conditions for steady interference pattern.
- Q.9** The photoelectric work function for a metal is 5 eV. Calculate the threshold frequency for the metal.
- Q.10** Draw a neat labelled diagram of variation of kinetic energy and potential energy with displacement in S.H.M.

- Q.11 Assuming an equation of magnetic force due to arbitrarily shaped wire, obtain an expression for force on a closed circuit in a uniform magnetic field.
- Q.12 Two tuning forks having frequencies 160 Hz and 170 Hz are sounded together to produce sound waves. The velocity of sound in air is 326.4 ms^{-1} , Calculate the difference between wavelengths of these waves.
- Q.13 What must be the ratio of the slit width to the wavelength for a single slit to have the first diffraction minimum at 45° ?
- Q.14 A body of mass 0.8 kg performs linear S.H.M. It experiences a restoring force of 0.4 N, when its displacement from mean position is 4 cm. Determine force constant and period of S.H.M.

SECTION - C

Attempt any Eight of the following :

(24)

- Q.15 With the help of a neat labelled circuit diagram, explain the use of metre bridge to determine unknown resistance.
- Q.16 Derive an expression for the magnetic field produced at the centre of a circular arc of a wire carrying current I .
- Q.17 With a neat, labelled schematic diagram, describe an experiment to study the characteristics of photoelectric effect.
- Q.18 A set of 8 tuning forks is arranged in a series of increasing order of frequencies. Each fork gives 4 beats per second with the next one and the frequency of the last fork is twice that of the first. Calculate the frequencies of the first and the last fork.
- Q.19 Calculate the current flowing through two long parallel wires carrying equal currents and separated by a distance of 1.35 cm experiencing a force per unit length of $4.76 \times 10^{-2} \text{ N/m}$.
- Q.20 Obtain an expression for the orbital magnetic moment of an electron rotating about the nucleus in an atom.
- Q.21 State and prove principle of parallel axes theorem.
- Q.22 Derive the laws of reflection of light using Huygen's principle.
- Q.23 a) Define and state unit and dimensions of Magnetization.
b) Explain magnetic susceptibility.
- Q.24 Calculate the wavelength associated with an electron, its momentum and speed when it is accelerated through a potential of 54 V.
- Q.25 The distance between two consecutive bright fringes in a biprism experiment using light of wavelength $6000 \text{ \AA}$ is 0.32 mm by how much will the distance change if light of wavelength $4800 \text{ \AA}$ is used?
- Q.26 At what distance from the mean position is the kinetic energy of a particle performing S.H.M. of amplitude 10 cm, three times its potential energy?

SECTION - D**Attempt any Three of the following:****(12)**

- Q.27** Derive an expression for linear velocity at lowest position, midway position and top-most position for a particle revolving in a vertical circle, if it has to just complete circular motion without string slackening at top.
- Q.28** Derive an expression for minimum speed to perform stunts in well of death. Part of a racing track is to be designed for a radius of curvature of 288 m. We are not recommending the vehicles to drive faster than 216 km/hr. With what angle should the road be tilted?
- Q.29** State Kirchhoffs law of electric network, (both laws)
When two cells of emfs E_1 and E_2 are connected in series so as to assist each other, their balancing length on potentiometer wire is found to be 3.2 m. When two cells are connected in series so as to oppose each other, the balancing length is found to be 0.7 m. Compare the emfs of two cells.
- Q.30** Show that only odd harmonics are present in the vibration of an air column in a pipe closed at one end.
- Q.31** Distinguish between interference and diffraction of light.
A double slit arrangement produces interference fringes for sodium light of wavelength 589 nm, that are 0.20 degree apart. What is the angular fringe separation if the entire arrangement is immersed in water? (Refractive index of water = 1.33)
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